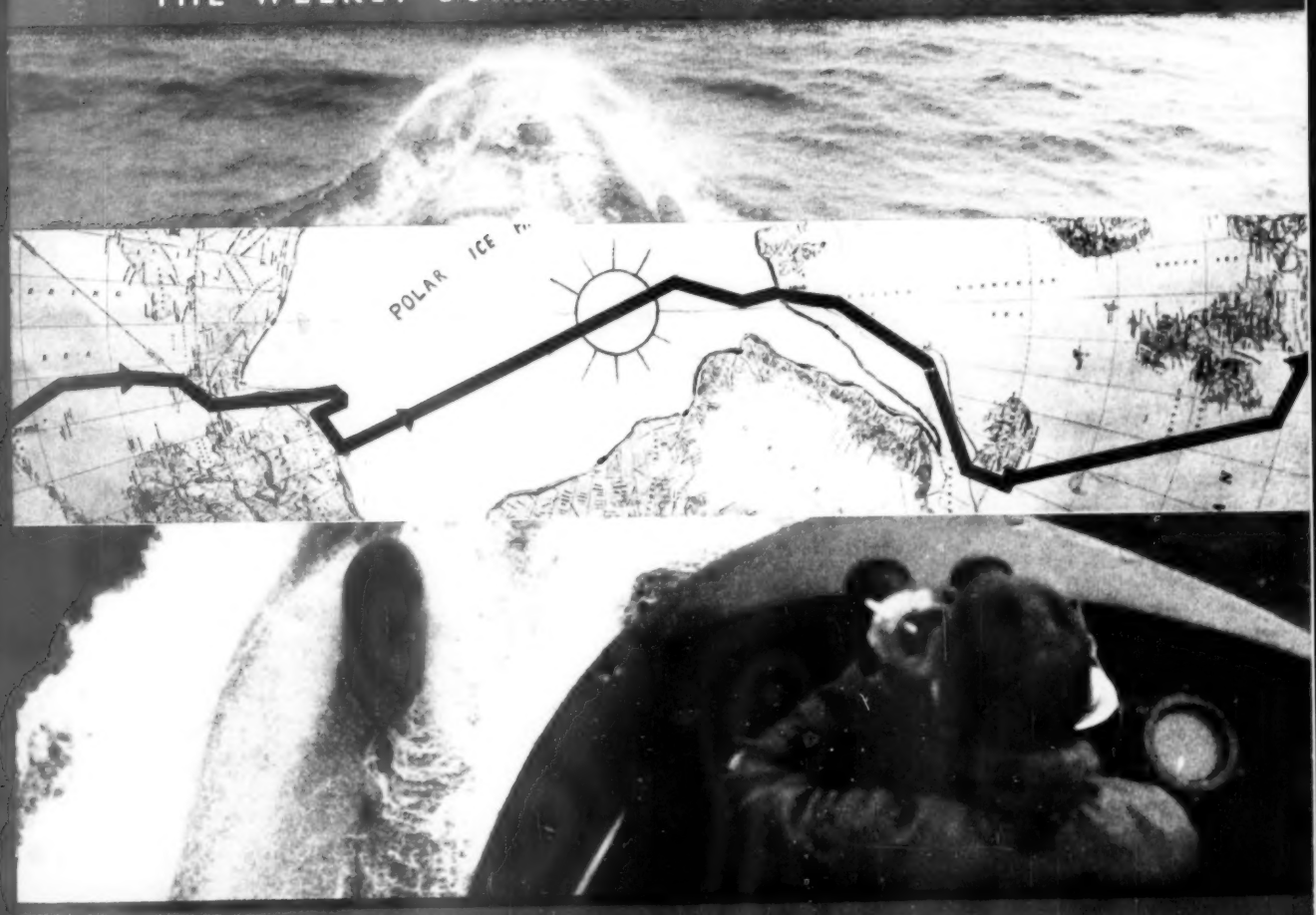
15¢
$5.50 A YEAR

August 23, 1958

VOL. 74 NO. 8 PAGES 113-128

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Icy Horizon

See page 115

A SCIENCE SERVICE PUBLICATION

ASTRONOMY

Space Target: Moon

Rocket probes can give more accurate knowledge, confirm some theories, produce new ones, and greatly increase present known facts about the moon.

➤ THE MOON, earth's nearest neighbor in space, has long delighted poets and lovers who have cared not so much about its secrets as its beauty.

Now the moon is a target for man's first rocket probe, aimed at taking photographs of its unseen side and gathering information on magnetic fields, temperatures, and micrometeorites and other particles in interplanetary space.

One or more of the five rockets launched in the lunar probe series should yield some of its secrets, giving earthbound scientists a more accurate picture of the moon than they now have.

It is already known that the moon has a diameter of 2,160 miles, somewhat more than one-fourth that of the earth. Its mass is about one-eightieth of the earth's, its density, three-fifths. Its average distance from earth is 238,857 miles, but ranges from 221,463 to 252,710 miles.

The moon's gravity, its attraction for bodies on its surface, is about one-sixth of gravity at the earth's surface. A man who can throw a baseball 400 feet on earth would be able to throw it nearly half a mile on the moon.

The moon rotates on its axis once in exactly the same time as it makes one revolution around the earth. Thus it keeps the same side, except for small oscillations, always turned toward the earth and some 40% has never been seen. The first and later lunar rockets are equipped to take crude black and white pictures of this hidden side.

To demonstrate the moon's motion with respect to the earth, stand in the center of a room and imagine that you represent the earth. Have another person take the part of the moon and stand a few feet away with his left side toward you. As he walks around you in a circle, he keeps his left side always toward you. You (the earth) never see his right side.

When he has returned to the starting point, he has faced in all directions (as in turning on an axis), and he has turned his body completely around.

To show what would happen if the moon did not turn on its axis, have your friend walk around you and face the same wall. You see first his left side, then the back of his head, then his right side and, finally, you get a direct view of his face.

The moon is moving through space at an average rate of 2,287 miles an hour or about 3,350 feet per second. In one hour, it will move a distance slightly greater than the apparent diameter of the moon itself.

Surface temperatures on the moon can vary nearly 500 degrees Fahrenheit. At the center when the moon is full, for instance, the temperature is 248 degrees Fahrenheit, whereas the same area when the moon is new has a tempertaure of about 200 degrees below zero Fahrenheit.

Near the time of the new moon, the rest of the lunar disk is nevertheless visible by a pale light, sunlight reflected from the earth, or earthshine. The combination of a bright sunlit crescent and a pale disk lit by earth-reflected sunlight is known as the "old moon in the new moon's arms."

At the moon's first quarter, half of the illuminated hemisphere is visible, just as it is a week after full moon. Between the new moon and the half-moon, whether waxing or waning, less than half the illuminated portion can be seen. This is known as the crescent phase. When more than half of the moon is illuminated, the phase is called gibbous.

The line separating the dark portion of the disk from the bright portion is called the terminator.

The moon's hidden side, of which man may soon have the first pictures, is not expected to be very much different from the 60% so long studied by both professional and amateur astronomers. The visible lunar surface is known to be rugged and desolate, and the hidden area should be the same, perhaps more so.

The moon is also airless, and where there is no air, there can be no clouds, no weather, no sound. There is, however, scenery in a sense.

Even with a small telescope, the craters and great dark areas that make up the features of "the man in the moon" are visible. The portions of the moon seen from the earth have been thoroughly mapped, the mountain ridges, craters and seas named. There are also rills, rays, cliffs and many other interesting formations.

There are two opposing theories concerning the origin of the moon's rugged surface. One is that the moon has been pelted by numberless meteorites, whose explosions on contact left the surface pitted with craters. There are, on the other hand, arguments for a volcanic origin, hot lava flowing from the moon's interior and then cooling to form craters.

Most astronomers agree, however, that whatever its origin, the lunar surface is now covered with a meteoric dust layer. There are different theories as to how thick this layer of dust is.

The relationship of the earth and its lunar satellite is a close one, much like that of a double planet.

The center of mass of the earth-moon system, the point around which the earth and moon mutually revolve monthly, is only 2,900 miles from the earth's center. It is therefore within the earth.

Science News Letter, August 23, 1958

● RADIO

Saturday, August 30, 1958, 1:30-1:45 p.m., EDT

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Mr. Davis will give his listeners "A Preview of the Geneva Atoms for Peace Conference."

MEDICINE

Polio Vaccine Can Cause Penicillin Reaction

➤ PENICILLIN-SENSITIVE people can get an allergic reaction from poliomyelitis vaccine shots.

Some manufactured polio vaccines contain traces of penicillin, just enough to cause skin eruptions in persons allergic to the antibiotic, Dr. Murray C. Zimmerman of the University of Southern California School of Medicine reports in *Journal of the American Medical Association* (Aug. 9).

A study of six patients who experienced reactions to polio shots, coupled with their past histories of sensitivity to penicillin, indicates that the minute amount of the antibiotic in many of the vaccines is responsible for the patients' skin eruptions.

Therefore, if a person is known to be penicillin sensitive, either a penicillin-free vaccine should be administered or an injection of penicillinase given before the vaccine shot. The penicillinase injection has no effect upon any of the ingredients of the vaccine except the penicillin.

Since all of the components of the polio vaccine, monkey protein, horse serum, formaldehyde, preservatives and other antibiotics, are potential causes of side reactions, it is essential that the exact cause of the sensitivity be determined accurately, Dr. Zimmerman cautioned.

Science News Letter, August 23, 1958

AGRICULTURE

Sugar Preserves Dairy Cream

➤ CREAM THAT stays dairy-fresh stored at room temperature for as long as six months is one of the results of the U. S. Department of Agriculture's dairy research program.

The new product, USDA scientists have reported, can be whipped, or used in any number of ways requiring sweetened cream. Pale yellow in color, it has a consistency and flavor much like that of sweetened condensed milk, only less sweet.

It is the addition of sugar that preserves the cream since bacteria cannot grow in a concentrated sugar solution. The final product contains 10% more butterfat than regular whipping cream and 22% more than coffee cream.

Dr. Arjen Tamsma and Raymond W. Bell, both USDA scientists, are chiefly responsible for the development of the preservation process which is described as a "simple one that any well-equipped dairy plant can carry out."

Science News Letter, August 23, 1958

GENETICS

Control of Heredity Seen

Two theories concerning mutations, one which describes them as occuring at random and one which describes them as predictable and controllable, promise a better future for man.

➤ A THEORY than man can control hereditary changes may have an immense effect on humanity.

The theory claims that irradiation and chemical treatment of reproductive organs can be perfected to produce desired changes in plants and animals.

In an exclusive interview with SCIENCE SERVICE, Dr. O. G. Fahmy, the leading proponent of the theory, said the eventual applications "would be of immense value to mankind."

Dr. Fahmy, Institute of Cancer Research, Royal Cancer Hospital, London, used the word "revolutionary" to describe his work. The previous theory, which many leading geneticists still hold to be the more accurate one, embraces the concept of randomness or unpredictabiliy of mutations.

Mutations are sudden permanent changes in the hereditary genes with corresponding changes in the progeny of the affected plant or animal.

The Fahmy group holds to the idea that genetic changes are not only predictable, but can be controlled by a skilled person.

If this theory holds true, Dr. Fahmy predicted, then farm animals will be mutated to produce more and better meats and dairy foods. Crops will be altered to withstand adverse weather conditions. Fruit trees will be made pest-resistant and watermelons made seedless.

Other endeavors also will benefit for the good of all mankind once geneticists become sufficiently knowledgeable in the intricacies of hereditary change mechanisms, the English geneticist said.

Dr. Fahmy conceived the idea of controllable mutations while working at the Royal Cancer Hospital in 1948. He said he noted that mutations produced by some chemicals were different from those produced by radiations. This led him to believe that radiations and chemicals known as the nitrogen mustards could be made to produce preferential, although not absolutely specific, changes in hereditary material.

MEDICINE

Half of Population Will Die of Heart Disease

➤ HALF OF THE NOW living population of the United States, or 88,000,000 persons, may die of heart or kidney diseases related to the cardiovascular system.

This means that every other man, woman and child has a two-to-one chance of becoming a victim of heart disease.

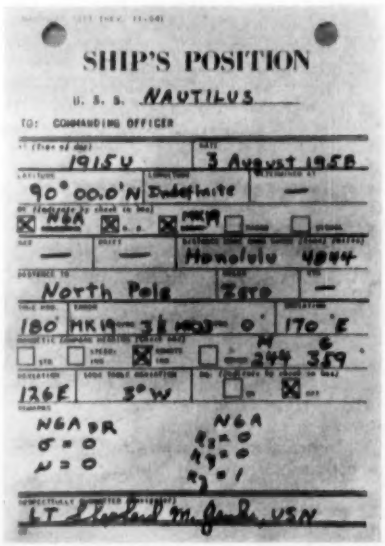
However, the best scientists and research facilities that the United States can muster are being organized to fight this killer.

The American Heart Association, in celebration of its 10th anniversary of research support, has awarded $8,000,000 for scientific studies during the 1958-1959 fiscal year.

Scientists working in 36 states received the most recent awards, 225 grants-in-aid. A Lebanese also received a grant-in-aid. They are additional to 186 national fellowship awards announced earlier this year.

Some of the problems these researchers will attack: Does the heart that has had one attack pump less blood than it previously did or normally should; does inherited high blood pressure harm a person, or is it "normal" for that individual; further work on the replacement of heart valves by valves made of plastic; chemical process by which blood clots may be dissolved; response to some known cardiac drugs; transplantation to replace a worn-out heart; where lipids, the fatty substance that lines the arterial walls, come from, and what role they play in arteriosclerosis, the disease that took over 400,150 lives in 1955.

Science News Letter, August 23, 1958


SHIP'S POSITION

U. S. S. NAUTILUS

TO: COMMANDING OFFICER

1915 V | 3 August 1958

90° 00.0' N | Indefinite

Honolulu 4844

North Pole | Zero

180° | 170° E

136 E | 3° W

N6A DR

G = 0

N = 0

N6A

LT Cleveland M. Grubb, USN

HISTORIC PAGE — A photostatic copy of the page of the ship's log on the day the U.S.S. Nautilus reached the North Pole gives details of the conditions of longitude and latitude, with notes on instruments used and possible errors in the measurements, upon arrival. Special navigational instruments, including gyrocompasses, were used. The Roman and Greek letters refer to the ship's position and the instruments used for taking positions.

One of the most prominent members of the opposing "random theory" group is Dr. Hermann J. Muller, Indiana University, who won a Nobel Prize in Medicine and Physiology in 1946 for his discovery that X-rays produce mutations. Both he and Dr. Fahmy attended the International Congress on Radiation Research in Burlington, Vt.

Dr. Muller told SCIENCE SERVICE that a great deal of research has shown "striking similarities in mutations produced by radiations and chemicals." This observation tends to show that there is no preferential action on mutations, that there is little if any possibility of controlling mutations.

However, Dr. Muller said, he recently has come to see a great deal of merit in Dr. Fahmy's work. The father of radiation genetics feels that at this juncture "the weight of evidence could tilt the scales to one side or the other."

As for the practicality of the "random theory," Dr. Muller said irradiation and chemical treatment of germ cells also could result in improved varieties.

"It would be a haphazard approach," he said, "but one good mutation in a thousand would be worth the effort."

The theoretical struggle may continue in a state of flux for some time to come. At the outcome, however, humanity stands to gain either way.

Science News Letter, August 23, 1958

OCEANOGRAPHY

Two U.S. Atomic Subs Sail Under North Pole

See Front Cover

➤ TWO OF the United States' atomic-powered submarines have succeeded in completing a polar sea trip under the Arctic ice cap.

Sailing from Pearl Harbor on July 23, the submarine Nautilus reached the North Pole at 11:15 p.m., EDT, on Aug. 3. The photograph on the cover of this week's SCIENCE NEWS LETTER shows the vessel at the surface as an officer studies the distant ice cap. The inset map shows the path taken by the U.S.S. Nautilus in its journey.

The U.S.S. Skate, which sailed from New London, Conn., on July 30 to conduct under-ice explorations in the Arctic, reached the North Pole at 9:47 p.m., EDT, Aug. 11, making the crossing from the Atlantic to the Pacific Ocean.

Reports of measurements made during the Nautilus' voyage indicate there is a "deep sea valley" ranging from 300 to 1,200 feet deep. The water at the Pole was 13,410 feet deep, or 1,927 feet deeper than had been expected. Undersea mountain ranges were also found in the Arctic Basin.

Commander W. R. Anderson said the Nautilus cruised more than 400 feet beneath the ice cap which was ten to 15 feet thick, two to three feet less than it is in the winter.

A Presidential unit citation, the first ever given in peacetime, was awarded to the crew of the Nautilus. The Legion of Merit citation was awarded Commander Anderson.

Science News Letter, August 23, 1958

MEDICINE

Body's Emergency Fuel

Recent research shows that unesterified fatty acid, stored in the adipose tissue and transferred when needed to the blood plasma, gives emergency sustenance to the body.

➤ THE MAJOR energy source for powering the heart when the human is not eating, together with its supply depots and transport system, has been found.

The fuel that keeps the human power plant going during fasting between meals, snacks and coffee breaks is unesterified fatty acid (UFA). Without it, a human might die between dinner and breakfast. The alternative would be to eat continuously.

UFA is the body's starvation energy. Although it has been known to exist in blood plasma for many years, it is only within the past few years that its life-sustaining role has been unraveled.

Heart muscle cells can never stop working. They, like other cells, must have food to convert into energy, much the same as an automobile needs gasoline and a steam power plant needs coal. Without eating, even for as short a period as between dinner and breakfast, food must be available to these cells. An emergency supply or some other source of fuel is needed. This has been found to be unesterified fatty acid. UFA literally gives the heart the "oomph" needed to sustain life in the absence of the foods we normally eat.

This fact was uncovered only recently by scientists at the National Heart Institute and in independent studies based on different techniques by sicentists at the Rockefeller Institute in New York.

The Heart Institute researchers have been able to draw this picture of UFA and its transport system so far: it is the body's starvation energy, held in storage depots in the adipose tissue. When the human is not eating, UFA is transferred from its adipose tissue depots to the blood and expressed to the cells where it is needed.

This was determined largely from two lines of investigation. The first resulted from studies of arteriovenous blood samples taken from human volunteers who were subjected to starvation periods of 15 or more hours and then feeding periods.

These studies showed that blood traveling from fatty tissue to the heart during and after starvation is rich in UFA. On its return, the blood in the arteries is conspicuously low in UFA. Thus, the concentration of unesterified fatty acid in blood plasma clearly showed a transport of UFA from adipose tissue to myocardium, skeletal muscle and viscera.

When glucose and insulin are administered to fasting humans, the amount of UFA decreases. The same is true when proteins are given but to a lesser degree. This suggests that the adipose tissue responds to starvation needs of the body through some mechanism sensitive to the bodily balance of non-fat calories.

The second line of investigation, involving a radioactive tracer, led to the timing of the UFA express train from the moment it leaves its adipose tissue depot until its waste is exhaled as carbon dioxide from the lungs. This study showed that in about two minutes the energy from UFA begins to be used by the hungry cells.

The implications of these findings are many. Several national health problems, like obesity and diabetes, are related directly or indirectly to fat metabolism and adipose tissue.

They might be used as a measuring device to find out which drugs affect adipose tissue metabolism and why—thereby leading to some of the answers about how persons become and stay fat.

They promise to be instrumental in the study of diabetes, which is rising in intensity as a degenerative disease, where carbohydrate metabolism is impaired and fat metabolism accelerated. Insulin, for example, is known to affect adipose tissue.

They may be a foot in the door for research on hardening of the arteries.

As one scientist remarked in regard to arteriosclerosis, diabetes and obesity in their relation to unesterified fatty acid and its role during fasting, "fat eaters live off of fat, whether on a diet or not."

(This is the second in a series on research at the National Institutes of Health.)

Science News Letter, August 23, 1958

ZOOLOGY

"Social Pressures" at Zoo Affect Animals' Lives

➤ "SOCIAL PRESSURES" at the zoo have been blamed for the development of arteriosclerosis among some of the animals.

After a 40-year study of birds and mammals that died in the Philadelphia Zoo, two scientists have reported that they found a high frequency of narrowed blood vessels among the caged animals.

Neither aging nor diet seem to bring on the disease as much as "social pressure" resulting from an increased animal population in the zoo.

This "social pressure" or "group relationship" of growing numbers of animals caged as groups in the Zoo caused an imbalance in the secretion of hormones by the adrenal glands, they suggested. Adrenal glands adjust the body to stresses.

The opposite, inactivity due to being caged alone, was suggested as the second factor.

A report on autopsies of more than 11,000 birds and mammals revealed that among the mammals, the greatest incidence of arteriosclerosis was found in the family that includes the South American rodent, the agouti, relative of the guinea pig.

Second highest was the family that includes the kangaroo. The lowest incidence was found to be among the family that includes squirrels.

Among the birds, a higher frequency of arteriosclerosis was found among the larger birds, pheasants, ducks, geese, swans, cockatoos, parrots, macaws, storks, herons, hawks and eagles.

The study was made by Dr. Herbert L. Ratcliffe, director of the Penrose Research Laboratory of the Philadelphia Zoological Society and professor of comparative pathology at the University of Pennsylvania, and Dr. Michael T. I. Cronin, chief of the pathology division of Schering Corporation, and reported to *Circulation* (July).

Science News Letter, August 23, 1958

SCIENCE NEWS LETTER
VOL. 74 AUGUST 23, 1958 NO. 8

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington 6, D. C., NOrth 7-2255. Cable Address: SCIENSERVC.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

Copyright © 1958 by Science Service, Inc. Republication of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicated services issued by Science Service. Science Service also publishes CHEMISTRY (eight times a year) and THINGS of Science (monthly).

Printed in U.S.A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1897. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40 P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283) authorized February 28, 1950. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member Audit Bureau of Circulation.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: William W. Rubey, U. S. Geological Survey; Wallace R. Brode, National Bureau of Standards; Douglas Whitaker, Rockefeller Institute for Medical Research. Nominated by the National Academy of Sciences: Edward U. Condon, Washington University; Harlow Shapley, Harvard College Observatory; Philip Bard, Johns Hopkins University. Nominated by the National Research Council: I. I. Rabi, Columbia University; Leonard Carmichael, Smithsonian Institution; John R. Dunning, Columbia University. Nominated by the Journalistic Profession: O. W. Riegel, Washington and Lee University; Michael A. Gorman, Flint Journal; Lee Hills, Detroit Free Press. Nominated by the Scripps Estate: Edward J. Meeman, Memphis Press-Scimitar; Frank Ford, Washington, D. C.; Charles E. Scripps, Cincinnati, Ohio.

Officers — President: Leonard Carmichael; Vice President and Chairman of Executive Committee: Charles E. Scripps; Treasurer: Wallace R. Brode; Secretary: Watson Davis.

Staff — Director: Watson Davis. News Editor: Howard Simons. Writers: Marjorie Van de Water, Ann Ewing, Jane Marye, David Pursglove, Benita Tall, Helen Buechl. Science Youth Division: Harold A. Edgerton, Joseph H. Kraus, Dorothy Schriver, Shirley Moore. Photography: Fremont Davis. Production: Priscilla Howe, Marcia Nelson. Syndicate Sales: Hallie Jenkins. Interlingua Division in New York: Alexander Gode, 80 E. 11th St., GRamercy 3-5410. Advertising Manager: Fred A. Moulton, MEtropolitan 8-2562.

PUBLIC HEALTH

Urge Caution in Radiation

➤ A SPECIAL United Nations scientific committee on the effects of atomic radiation has called for a decrease in the exposure of all humans to radiation from all sources under mankind's control.

Included would be the radioactive fallout from tests of atomic and hydrogen bombs. In a carefully worded statement, in which the section dealing with suspension of nuclear bomb tests was not approved by Russia, Czechoslovakia and the United Arab Republic, the UN committee concluded that "all steps designed to minimize irradiation of human populations will act to the benefit of human health."

Such steps, the committee reported to the UN General Assembly, include avoiding unnecessary exposure resulting from medical, industrial, and other procedures for peaceful uses of radiation. They also include "the cessation of contamination of the environment (atmosphere, ground, plants, etc.) by explosions of nuclear weapons."

The committee pointed out that effective control of all these sources of radiation involved national and international decisions outside the scope of its work.

Even the smallest amounts of radiation are likely to cause unwanted and harmful genetic effects. Any radiation reaching the reproductive cells can cause mutations that are passed on to future generations. Small amounts of radiation may also cause injury to body cells concerned with the maintenance of the individual, such as bone marrow, blood, liver or nervous system cells.

Since both the genetic and direct-body effects may have long delays in appearing, the committee urged "great caution" in treating the radiation problem. So little is known about the long-term effects that present damage estimates are possibly very much underestimated.

The committee estimated that, even if there were no more nuclear tests, from 400 to 2,000 persons each year would develop leukemia due to radioactivity in fallout from previous weapons tests, provided there is no minimum dose necessary for leukemia development.

Because of the increasing levels of radiation exposure and of uncertainties concerning the nature and extent of radiation effects on man, particularly when received at low dose rates over long periods, the committee called for much further research on the effects of radiation on living matter.

Science News Letter, August 23, 1958

ROENTGENOLOGY

X-Ray Examination Shortens Life Span

➤ X-RAY EXAMINATIONS may help save your life but they also shorten the life-span.

Why this happens is still a mystery, as in fact no visible signs of sickness are displayed that indicate how much irradiation has been received. This was reported by two scientists at the International Congress on Radiation Research in Burlington, Vt.

They warned that for every roentgen received over the whole body for short periods of time a human being loses about 12 days of life. A roentgen is a measure of radiation dosage. Some fluoroscopes may pour several roentgens into the body in the course of a single examination.

The scientists, Drs. H. J. Curtis, Brookhaven National Laboratory, and H. D. Brues, Argonne National Laboratory, made it clear that X-ray examinations in many cases are urgently needed for life-saving and life-prolonging medical diagnoses. They believe that practitioners using X-rays should fully understand the nature of radiation, its benefits and its dangers.

Both men agreed that the fluoroscopic method of sizing feet in shoe stores should be abolished. It is not necessary, it is dangerous to the customer, and especially so to the salesman who is continuously exposed to large doses.

The actual mechanisms by which radiations of all kinds shorten lives are not known. Dr. Curtis, who has conducted studies on mice and has interpreted his results to include humans, said that the effect of radiation on animals is a curious one. The animals may not show signs of sickness, but the more they are irradiated, the less time they have to live.

Another unusual aspect of radiation exposure is that long-term doses do not have the life-shortening effect as acute doses.

Dr. Curtis says there is no minimum dose for the life-reducing action, although Dr. Brues disagreed with him. Dr. Curtis believes that the natural background radiation all over the earth has a small, but nonetheless definite, effect on the length of the human life span.

Science News Letter, August 23, 1958

BIOLOGY

Antarctic Fish Parasites Sent North for Study

➤ A UNIQUE shipment of fish from Antarctica will be making its way north to the Virginia Fisheries Laboratory, Gloucester Point, Va.

The fish are not what interest Laboratory scientists, however. The fish are hosts to certain parasites, especially those found on fishes' gills, that do interest scientists.

These parasites, Dr. William J. Hargis Jr. said, can provide a great deal of information about the relationships and travels of fish. Over long periods of time the "parasites have evolved in ways which enable them to survive year after year on the fishes to which they are attached," Dr. Hargis explained. Most parasites have become so highly specialized that they will not develop unless a specific host fish is available.

Study of the fish parasites "has tremendous potential importance" to our understanding of parasitism itself, the scientist pointed out.

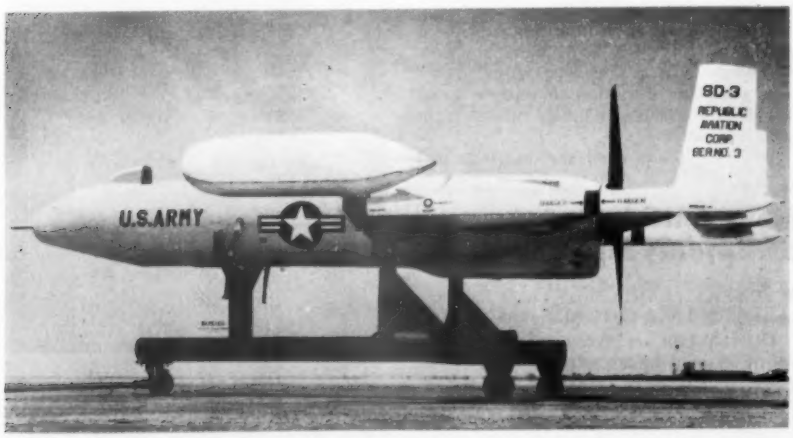
Members of the International Geophysical Year expedition in the Antarctic are collecting and shipping the fish to Dr. Hargis. Because of the winter season in the Southern Hemisphere, however, it is believed to be doubtful if the shipment will arrive before the end of the year.

Two years ago Dr. Hargis made a similar study of fish parasites based on gills taken from South African coelacanths.

Science News Letter, August 23, 1958

An active 90-pound *child* bears a weight of 1,350 tons a day on his shoes; this is pounding weight, involving far greater stresses on the shoe.

Pellets containing 16 grams of *plutonium* serve as neutron sources capable of producing 1,600,000 neutrons a second to bombard other atoms.



SURVEILLANCE DRONE—Details of the SD-3 combat surveillance drone —a pilotless plane—being built for the U. S. Army Signal Corps by Republic Aviation Corporation, Farmingdale, N. Y., are revealed in this photograph of the first model. The propeller-driven vehicle would use sensory techniques to keep watch on possible enemy installations and movements. The drone is zero-length launched and recoverable.

PSYCHOLOGY

Improve Care for Insane

➤ THE SAME HOSPITAL atmosphere and similar types of custody and treatment should be provided for "criminally insane" patients as for other mentally ill persons.

This recommendation is made by Prof. F. LeGrande Magleby of the University of Utah on the basis of a poll of superintendents of state hospitals. Prof. Magleby reports his findings in *Mental Hygiene* (July), publication of the National Association for Mental Health.

Fewer than half of the criminally insane are more violent or dangerous than the average non-criminal patients in state hospitals, is the opinion expressed by 46 of 63 superintendents. Only five believe that all the criminally insane are more violent or dangerous than the average non-criminal patients.

"Hardly a day goes by in a big mental hospital," comments one superintendent, "that someone does not become combative and occasionally one may lose his life."

"There is not a single state hospital," said another, "which does not have many paranoid schizophrenics, who are oftentimes more dangerous than the ones in the criminal department."

Only 19% of 6,578 criminally insane patients in 51 state hospitals are classified as guilty of or awaiting trial for murder. Other patients were charged with forgery, theft, drunkenness, perjury, attempted suicide and other offenses.

It was the opinion of 39 superintendents (67% of those reporting) that fewer than half of the criminally insane in state hospitals are more apt to attempt to escape than average non-criminal patients.

Present practice varies greatly in treatment of the criminally insane. The Colorado and New Mexico state hospitals provide similar types of custody and treatment for the criminal and non-criminal patients. In some instances they work side by side on hospital farms or shops.

At Rusk, Texas, by contrast, the majority of the criminally insane are housed in separate buildings which are completely surrounded by two "escape-proof" fences topped by electrically charged wires.

One superintendent reports that he has among his "criminally insane" a 10-year-old boy who killed another person. His behavior in the hospital is quite acceptable and he attends classes, social activities, recreation, etc.

Science News Letter, August 23, 1958

PSYCHIATRY

Study Schizophrenic Brain

➤ EVIDENCE that schizophrenia may be the result of chemical immaturity of the nervous system has been offered by a Harvard research scientist.

Adult schizophrenics were found to have considerably less neuraminic acid, a component of the brain's gray matter, in the spinal cord fluid than do nonschizophrenics, Dr. Samuel Bogoch of the department of psychiatry, Harvard Medical School, and neurochemical research laboratory of the Massachusetts Mental Health Center, Boston, reports in the *Archives of Neurology and Psychiatry* (Aug.), published by the American Medical Association.

There have been many attempts to show some chemical cause of schizophrenia through the study of blood and urine, but there has been no definite demonstration of a chemical disorder in the central nervous system proper, he explained. This evidence opens new avenues of investigation into possible chemical causes of schizophrenia.

The levels of neuraminic acid in the cerebrospinal fluid of adult schizophrenics is "comparable only to values found in some children under seven years of age," Dr. Bogoch declared.

The low values in adult schizophrenic patients may indicate a form of chemical immaturity that would correlate well with clinical evidence of a failure of psychological maturity in the schizophrenic.

Dr. Bogoch studied the neuraminic acid concentrations in the cerebrospinal fluid of 29 adult schizophrenic patients; 72 children under seven years of age; 29 children between the ages of seven and 15, and 65 nonschizophrenic adults.

The exact function of neuraminic acid in the nervous system is not definitely known, he added. It appears to play some role in the function of the "blood brain barrier," which helps maintain the special environment of the brain.

This new theory can be proved or disproved, Dr. Bogoch said. Tests are now underway to determine the effect of the administration of neuraminic acid itself and of neuraminic-acid-containing substances to psychotic patients.

Science News Letter, August 23, 1958

BIOLOGY

New Antibiotic From Streptomyces Fungus

➤ DESERT SAND may have yielded another antibiotic to help fight disease.

Desertomycin, as the new antibiotic is called because the Streptomyces fungus that produces it is found in African desert sand, has a "very significant" cell-killing or cytotoxic effect, four Hungarian scientists report in *Nature* (Aug. 9). Test tube experiments show that it inhibits the life-activity of leukemic cells.

The antibiotic may prove to be effective against some of the many disease-causing organisms now becoming resistant to penicillin and streptomycin.

Flavofungin, an antibiotic, was reported earlier as being produced by the same fungus, *Streptomyces flavofungini*.

J. Uri and R. Bognar of the University of Debrecen, I. Bekesi of the Hungarian Academy of Sciences, and B. Varga of the Pharmaceutics Factory "Hajdusagi," Debrecen, made the report.

Science News Letter, August 23, 1958

CHEMISTRY

Rubber Holds Properties At Temperature Extremes

➤ A SYNTHETIC rubber is unharmed by oils and aviation fuels, and retains its properties at high jet aircraft temperatures, as well as at very low temperatures.

The nitrile silicone rubber maintains its strength at temperatures ranging from 100 degrees below zero Fahrenheit to 500 degrees above.

Most important to America's national defense program, however, is the rubber's resistance to oil, kerosene and aviation fuels, making possible new designs of gaskets, fuel lines and other components of modern aircraft.

The latest entry in the rapidly growing field of specialty silicones was demonstrated by the General Electric Research Laboratory of Schenectady, N. Y.

Although many of the individual properties of the new rubber are found in other recently developed synthetics, the GE product is the first to claim marked oil resistance at such a wide temperature range of operation.

Science News Letter, August 23, 1958

OIL RESISTANCE — Dr. Ben A. Bluestein of General Electric's silicone products department, Waterford, N. Y., shows how oil-resistant the new rubber (left) is compared with ordinary silicone rubber. Both samples were the same size before being placed in a jar of jet engine fuel.

MEDICINE

Cholera Claims 20,687

Since January, cholera, dreaded throughout recorded history, has been leaving a well-worn trail of death across parts of the Far and Middle East.

➤ THE CHOLERA EPIDEMIC that is sweeping India, Cambodia, East Pakistan, Burma, Nepal and Thailand has a tenacious grip that has resulted in 20,687 deaths among an estimated 48,279 cases reported since January.

Most present day Americans, however, have had little contact with this disease.

Cholera is an infectious disease, caused by an organism that inhabits the gastro-intestinal tract. It results in vomiting, diarrhea and dehydration.

Sanitary habits play a major role in the prevention and control of cholera. Strict control of the water supply, of food and food handlers and of flies is necessary for successful control. Immunization by vaccine is effective for from three to six months after administration. While this is not a guaranteed method of prevention, it is an effective barrier to the spread of the disease.

Antibiotics and sulfonamides have little significant effect upon cholera infection.

Cholera has been known in India for centuries. It spreads westward by two routes—by sea to the shores of the Red Sea, Egypt, and the Mediterranean; and by land to northern India and Afghanistan, to Iran, central Asia, on to Russia.

In the great invasions of Europe in the 19th century, it sometimes followed one route and sometimes another. An Indian epidemic of 1817, reached Europe by way of Iran (then Persia), and to Russia by 1830. From there it extended to America.

Another epidemic of 1841 followed the same track and reached Europe and America in 1847. A third took place in Asia in 1850 and entered Europe in 1853; this epidemic was particularly severe throughout North and South America.

The spectacular path of the epidemic of 1892-95 left a trail of death on the overland route. It traveled with unprecedented rapidity, five months, from the North-West provinces of India, to Leningrad (then St. Petersburg). It was only a matter of a few days before it reached Hamburg. From there it spread to England and the U. S.

During the period of 1910-1925, cholera continued to be prevalent in India. During 1918-1919, when the disease was also epidemic in China, the recorded mortality for each of those years reached 500,000.

The U. S. Public Health Service has for some time recommended cholera shots for citizens visiting the countries now experiencing the epidemic.

Science News Letter, August 23, 1958

NATURAL RESOURCES

"Backyard" Wood Needed

➤ A GRASSROOTS movement is beginning that promises to contribute much towards solving a national problem, our dwindling timber resources.

Representatives of the 4,500,000 small woodlands owners have scheduled meetings throughout the nation to see what can be done to get the best use out of the timber they own. The aim is to bring the trees and forest soil, which includes some of the best land in the United States, under scientific management.

The first of these meetings was held in Wausau, Wis.

Currently, many of the small woodlands owners are neither getting as much income out of their forests as they could, nor growing as much marketable timber as the land can yield.

Some 55% of all commercial forest land is owned by farmers and other small landholders, the U. S. Forest Service reported. There is a growing need for timber, and successful management of the small forest could add millions of feet of timber to our resources.

Interest in the timber resources problem is "boiling up," George Vitas of the Forest Service said. Landowners are getting together, within their states or in cooperation with neighboring states, to discuss problems and sample opinion on how to get more out of their woodlots. Local commercial groups as well as Forest Service representatives are cooperating.

Twenty-two meetings, being held from now through November, may result in the nation's fulfilling its timber needs: twice as much wood as being used presently, available by the year 2000.

Science News Letter, August 23, 1958

MEDICINE

Soot Particles Deposited In Lungs Cause Damage

➤ THE EVERYDAY SOOT particles that find their way into obscure pockets of our lungs are now suspected as the cause of deterioration of lung structure and function.

A study conducted at the New Orleans Veterans Administration hospital showed that a lung condition, known medically as chronic pulmonary emphysema, tends to develop in areas of the lungs where soot nestles.

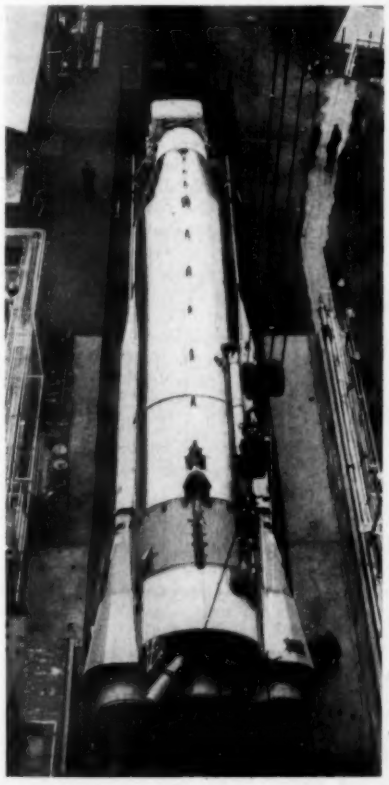
Emphysema is a condition in which the lungs overexpand and breathing becomes difficult and less effective, Dr. Charles P. Oderr, the hospital's chief of radiology, explained.

The research study indicated that emphysema is much more common and begins developing at a much earlier age than had been thought.

The investigators "photographed" lung tissue specimens through a beryllium window tube instead of using the conventional X-ray tube.

Of 125 persons studied at the hospital, 13% were clinically diagnosed, while an additional 45% showed evidence of the disease when examined through the beryllium window. Persons with indoor jobs involving dust contact had more disease than those with non-dusty indoor jobs, while those with outdoor jobs were intermediate.

Science News Letter, August 23, 1958



ADDED ENGINE—The U. S. Air Force's Atlas ballistic missile will have an intercontinental range of more than 6,000 miles as a result of the addition of a third engine. The new sustainer is in the center of the thrust section with booster engines on either side, as seen in this overhead view of the missile lying on its handling trailer. This view of the missile was taken as it was being backed into position for erection in the tower. Angled pipe above the center engine is the turbopump exhaust.

GENERAL SCIENCE

Newspaper Readers Want More Science News

➤ TWO OUT of three readers would like to see more science news in their newspapers, even at the expense of other news.

This was revealed in a nation-wide survey undertaken by the National Association of Science Writers and New York University and reported in New York. The survey included 1,919 persons who were carefully selected to represent a cross section of the American reading public.

The survey also revealed that the public has a high regard for science and scientists, although a strong minority views both with suspicion and fear.

These are some of the highlights of the survey which was conducted by the Survey Research Center of the University of Michigan with the aid of a grant from the Rockefeller Foundation:

1. Two-thirds of those interviewed reported they received some science news from newspapers and about half of these persons said they depended on the press primarily for science information.

2. Three out of every four persons could recall at least one specific science news item.

3. More than one-third reported that they read all of the medical news in their newspapers. More than one-fourth said they read all the non-medical science news.

4. More than two-fifths wanted newspapers to print more medical news, and more than one-fourth wanted more space given to other science items.

5. Persons living west of the Rocky Mountains seem to be more enthusiastic about science news than other Americans.

The study also disclosed that one out of every seven readers is curious about anything in science, even such topics as molecular structure and stellar discoveries. This was pointed out by Dr. Hillier Krieghbaum, chairman of the NASW surveys committee and associate professor of journalism at NYU.

Science News Letter, August 23, 1958

ENGINEERING

Man on the Ground Flies Helicopter Like a Kite

➤ AN ELECTRONIC device that permits a man to lead a helicopter around on the end of a 50-foot tether was demonstrated in Stratford, Conn.

The man does not have to be a pilot to lead the flying aircraft around like an obedient bird, it was announced by Sikorsky Aircraft Division of United Aircraft Corporation, developers of the tether system. The "Go Man," as he is known, can guide the helicopter anywhere he wishes with only a couple hours' instruction.

The electronic equipment, which takes over complete control from the pilot, responds to tension and motion of the tether hanging down from the side of the cabin.

If the Go Man pulls down, the ship descends to a gentle landing. If he slacks off on the tether, the ship rises like a kite until he stops it with a gentle tug. If he walks right or left, backward or forward, the helicopter follows along obediently, and will change position as quickly and accurately as the Go Man's signals direct.

To put the tether system into operation, the pilot brings his craft to a hover within 50 feet of the ground and lowers the cable to the Go Man. He then engages the electronic sensing equipment to which the tether is attached and removes his hands and feet from the controls. Signal lights inform the Go Man when he has control, but the pilot can over-ride the tether system and regain command of his ship in an emergency.

Many military and civilian uses are anticipated for the tether system. Since a helicopter pilot's visibility is somewhat restricted directly underneath the ship, the tether will help in hooking up loads to be carried externally in the ship's cargo sling. The Go Man can guide the aircraft while another man hooks up the cargo.

The tether is also expected to facilitate such operations as placing utility poles in pre-dug holes, lowering tower sections into exact position, loading and unloading trucks, and other flying crane operations.

Science News Letter, August 23, 1958

ROENTGENOLOGY

Russians Report Sensitive Test for Radiation

➤ RUSSIAN scientists may have discovered an extremely sensitive method of detecting radiation sickness in its earliest stages.

They have found that nerves, rather than the blood as has been believed among Western scientists, are the first tissues of the human body to show signs of damage.

Their method can detect changes caused by doses of radiation one-fifth the level of present methods in the West.

This was reported by Dr. Nathalie Bach, a Soviet biochemist, during a press conference at the International Congress on Radiation Research in Burlington, Vt. Dr. Bach is a member of the Academy of Sciences, Moscow.

Dr. Bach said workers in Russian atomic plants who showed signs of radiation sickness are immediately taken off the job and placed in a sanitarium for rest and treatment. After recovery, they are sent on to other jobs.

The Russians found that a chronic dose of two-hundredths of a roentgen a day during a six-month period causes symptoms of headache, nausea, sweating and general malaise. They have also found changes within the nerve nuclei in the tiny bodies known as mitochondria. It all adds up, Dr. Bach said, to nerve damage.

She emphasized, however, that in the early stages the damage is reversible.

It takes five times as much radiation, one-tenth of a roentgen, to produce the first detectable changes in blood count.

The natural background radiation existing all over the earth averages about 15-hundredths of a roentgen a year. This is about one-fiftieth of the nerve-damaging dose.

Science News Letter, August 23, 1958

IN SCIENC

ASTRONOMY

Ultraviolet Radiation Of Night Sky Mapped

➤ A MAP of the night sky as it would look if human eyes were sensitive to the far ultraviolet was presented in Moscow, at the Fifth Assembly of CSAGI, governing body for the current International Geophysical Year.

The ultraviolet radiation was spotted in nebulous regions scattered throughout the Milky Way galaxy in which the sun, earth and planets are located. The seven strongly emitting areas found by rocket-borne instruments are in the regions of Orion; Taurus, the bull; Canis Major, the great dog; Argo, the ship; Leo, the lion; Virgo, the virgin, and Ursa Major, the great bear.

The far ultraviolet radiation of galactic origin was mapped at a wavelength of 1225 Angstroms to 1350 Angstroms by Drs. J. E. Kupperian Jr., A. Boggess III, J. E. Milligan and H. Friedman of the U. S. Naval Research Laboratory, located in Washington, D. C.

Science News Letter, August 23, 1958

GEOPHYSICS

Antarctic Glaciers Show Little Change in 46 Years

➤ COMPARISON of the fronts of many glaciers in Antarctica with their positions as shown in photographs taken 46 years ago on Scott's last expedition reveal little or no change in this interval.

This is in sharp contrast to the movement of glacier fronts in both northern and southern temperate latitudes, where evidence both for growth and recession have been found. The Antarctic studies support the idea that glaciers there are sluggish.

Examination of glacial deposits in the McMurdo Sound region of Antarctica showed that both the outlet glaciers from the ice cap and the alpine, or mountain, glaciers not connected with the ice cap have fluctuated widely in thickness and extent. In the last million years, at least three major advances and retreats are recorded, each less extensive than the former.

The two groups of glaciers are now independent but in the past they merged to fill McMurdo Sound with ice.

At several times, many large lakes formed when valleys were blocked by glaciers. Troy L. Pewe, glacial geologist of the U. S. National Committee for the International Geophysical Year, reported.

Although a chronology of the glacial advances and retreats, formation and destruction of lakes, and changes in sea level is recorded for the past million years near McMurdo Sound region, no direct connection has yet been made with the glacial chronology in other parts of the world.

Science News Letter, August 23, 1958

NCE FIELDS

BIOLOGY

Study Unique Fire Ant Venom

➤ THE IMPORTED fire ant, which has been running wild in the southeastern United States, damaging crops, and attacking livestock and humans, may do some good to offset the harm it is currently causing.

Right now, a team of scientists reports in *Science* (Aug. 8), the chemical composition of the fire ant venom and its effects on malignant cells—such as cancer cells—are being studied.

Tests of venom's toxicity indicate houseflies, termites, the boll weevil, rice weevil and two species of mites are highly susceptible to the poison. The growth of several types of microorganisms was also inhibited by venom diluted to one part in fifty.

"A thorough study of the antibiotic properties is now being made," the scientists report.

Analysis of the chemical properties of fire ant venom indicates it does not resemble any other insect venom.

The instantaneous paralysis produced by highly toxic samples of venom is very suggestive of a nerve poison. However, paralysis is unaccompanied by tremors or shaking, as with some other substances produced by ants. This venom causes a sedative reaction.

Murray S. Blum, J. Robert Walker, Philip S. Callahan and Arthur F. Novak of Louisiana State University report on the fire ant study.

Persons bitten by the imported fire ant can get relief by taking injections of Benadryl, the U. S. 3rd Army medical laboratory at Fort McPherson, Ga., reports.

The antihistamine has proved successful in treating adult victims. Treatment of infants and children weighing less than 100 pounds consists of graduated doses of epinephrine and antihistamines.

Science News Letter, August 23, 1958

MEDICINE

Effects of Aspirin Vary With the Kind of Pain

➤ MEASURING the effectiveness of a pain-killer is difficult in the laboratory, but a scientist reports that it can be done using "experimental pain."

Dr. F. B. Benjamin of the University of Pennsylvania's School of Medicine tested the responses of 16 men between the ages of 21 and 44 in an effort to determine how well a pain-killer acted under laboratory conditions. Despite early experiments with the measurement of pain that seemed to indicate that experimental pain is not suitable for evaluating a pain-killer or analgesic, Dr. Benjamin believes he has shown it can be used.

The test subjects received four kinds of pain, including immersion of the hand in ice water, radiation heat and contact heat, and ischemic pain—local blood shortage—induced by applying a blood pressure cuff to the upper arm. Each individual received aspirin and an ineffective "sugar pill" or placebo.

The aspirin was apparently most effective in raising the pain threshold for ischemic pain. Significant changes occurred only with this method of inducing pain. The emotional aspect of pain was possibly more important in the other methods.

"The difference between aspirin and placebo becomes more pronounced with the greater ability of the subject to evaluate pain objectively," Dr. Benjamin points out. With knowledge of the patient, even weak drugs could be tested.

As long as the differences between experimental pain and clinical pain are realized, the scientist concludes, the experimental approach to the testing of pain-killing drugs can still be used.

Dr. Benjamin reports his work in *Science* (Aug. 8).

Science News Letter, August 23, 1958

ENGINEERING

Ultrahigh Vacuums Created by "Pumps"

➤ BETTER VACUUM TUBES for new electronic wonders are being made by vacuum "pumps" that do not pump.

Ultrahigh vacuums are being created by changing unwanted gases in vacuum tubes to solids instead of removing them.

These apparent paradoxes are common practice of scientists using new ionic vacuum pumps that create such virtually perfect vacuums that the tiny pressures often cannot be measured by existing instruments.

In a review of recent ultrahigh vacuum advances in *Science* (Aug. 8), Dr. Lewis D. Hall, Varian Associates, Palo Alto, Calif., cites major advantages held by ionic pumps over older oil and mercury pumps used for many years to create the vacuums essential to electronics.

Most of the new "pumps," which actually are controlled electrical streams, involve no moving parts that must be adjusted or repaired. They eliminate pump fluids which sometimes contaminate vacuums. Ionic pumps do away with the necessity for bulky refrigeration equipment formerly used to maintain "cold traps."

Dr. Hall points out that usual definitions of the word "pumping" do not apply to the ionic pumps, but that scientists continue to call the devices "pumps" because they are capable of emptying a container of its gaseous contents.

Most of the pumps depend on the production of ions, or electrically charged particles, created when electrons are released from electrodes within the tube. The ionized gas particles then either combine with other materials in the tube to form a solid "fallout," become embedded in the tube walls, or are attracted to charged plates which confine them to a small area such that they no longer contaminate the vacuum.

Science News Letter, August 23, 1958

ENGINEERING

Better Engines Will Cost Less in the Near Future

➤ DIESEL ENGINES for automobiles and trucks will increase in efficiency and durability during the next few years, while their size, weight and cost decrease, a meeting of the Society of Automotive Engineers was told in Los Angeles.

Developments from engine research laboratories and from field tests added to "radically changing market requirements" will give diesels a new "forward look on engines" that will make them even more popular than the widely publicized gas turbine and free piston engines, D. T. Marks and N. M. Reiners of Cummins Engine Co., Inc., Columbus, Ind., predicted.

Among the improvements foreseen by the engineers will be reduced fuel consumption and repair cost and better matching of engines to vehicles and specific jobs, as well as reduced size, weight and cost.

Additional experience is being sought with turbo-diesel engines to make them more attractive than the straight gas turbine.

Science News Letter, August 23, 1958

ELECTRONICS

Bureau of Standards Opens Electronic Center

➤ The National Bureau of Standards has dedicated its new $2,500,000 Electronic Calibration Center at Boulder, Colo.

Following the dedication ceremony, Dr. Allen V. Astin, NBS director, opened a three-day conference on Electronic Standards and Measurements, which was attended by more than 400 scientists.

Dr. Astin said the electronics industry has expanded so rapidly in the last ten years that its needs for standards and measurement techniques, and for an orderly system of measurement units, have outstripped the development of such services.

The Calibration Center was set up in response to the urgent and continually increasing need of both industry and the armed services for accurate electronic equipment to be used in radar, aircraft control, missile guidance, and satellite launching and tracking.

The Center's primary mission is to calibrate interlaboratory secondary standards for such quantities as voltage, power and impedance against master standards to be maintained at the Boulder laboratory. These interlaboratory standards, in turn, will be used to assure the accuracy of working standards on the production line and in overhaul stations.

Dr. Astin said the Calibration Center would not only reduce the probability of error but also provide an effective network tying electronic standards to the standards of length, mass and time.

The importance of these interrelationships, he pointed out, is often forgotten "when we get to that end of the measurement spectrum which we call production."

Science News Letter, August 23, 1958

ASTRONOMY

Mars Draws Near

The three planets, Mars, Jupiter and Saturn, in addition to many first-magnitude stars, will be evident in the September evening sky.

By JAMES STOKLEY

➤ STEADILY DRAWING closer to the earth, the red planet Mars is becoming increasingly conspicuous in the evening sky. About 69,700,000 miles away at the first of September, it will move in to a distance of 55,400,000 miles by the end of the month. At the same time it will increase in brightness about 75%, reaching magnitude minus 1.1 on the astronomical scale by Sept. 30.

The position of Mars, which is in the constellation of Taurus, the bull, is shown on the accompanying maps. These depict the sky as it appears about 10 p.m., your own kind of standard time (add one hour for daylight saving) on Sept. 1; an hour earlier at the middle of the month, and two hours earlier at the close. The red color of Mars, and the fact that it is brighter than any other planet or any star visible at the same time, make it easy to identify.

Earlier in the evening, however, Jupiter is also seen, and is even brighter. It is in Virgo, the virgin, and sets before the times for which our maps are prepared: at about nine o'clock at the first of September. By the end of the month it will descend below the horizon so soon after the sun that you will not be able to see it at all.

Saturn is shown in Ophiuchus, the serpent-bearer, low in the southwest. Of magnitude 0.7, it is about a third as bright as Mars is, at the beginning of September.

Turning to the stars that are seen these evenings, the brightest is Vega, in Lyra, the lyre, high in the west. A little to the east of this group you will see Cygnus, the swan, in which the star Deneb shines. Toward the south is Altair, in Aquila, the eagle. These three bright stars, all of the first magnitude, form what is sometimes called the summer triangle, because it is so conspicuous on summer evenings.

Three other first-magnitude stars are also shown. All of them are now quite low in the sky, where the increased absorption of their light by the atmosphere causes them to appear rather fainter than they should.

Low in the northeast, to the left of Mars, you will find Capella, in Auriga, the charioteer. In the northwest is Arcturus, in Bootes, the bear-driver. And in the south there stands Fomalhaut, in Piscis Austrinus, the southern fish.

Early Rising Planet

In the early morning the planet Venus appears in the east. It rises about an hour and a half ahead of the sun at the beginning of September, an hour at the end. About the ninth Venus will be joined by Mercury, innermost of all the planets, which will then be farthest west of the sun. By the time it appears, dawn will have started, and the sky will no longer be completely dark.

On the evening of September 4, when neither will be visible in this part of the world, Mercury will pass to the south of Venus; the following morning they will still be close together. On the 18th, as Mercury draws back toward the sun, it will again pass Venus, about 1:00 a.m., but by then Mercury will be hard to see. The moon, then a narrow waning crescent, will pass both of the planets early in the morning of Sept. 12. And on the morning of the tenth Mercury can be seen passing very close to the star Regulus, which is in Leo, the lion, and is of the first magnitude. The approach will appear so close that the pair will look like one star to the naked eye, but a pair of binoculars will show them to be separate.

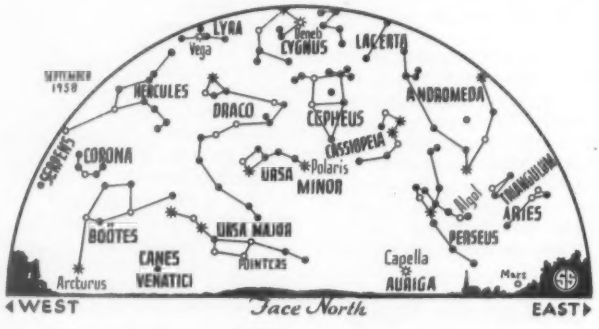
Autumn Arrives

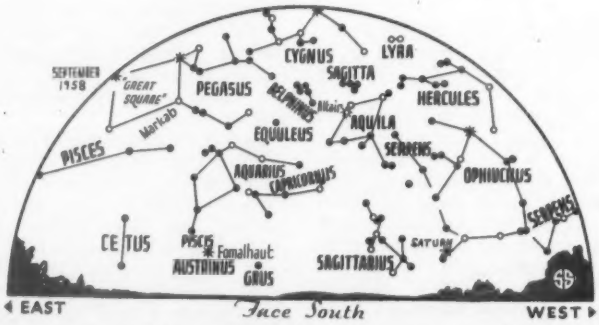
Another important event on the astronomical program for September will occur at 8:10 a.m., E.S.T., on the 23rd. This is the equinox, the time when the sun, which has been moving southward since last June, reaches the halfway point. It will then be standing directly over the equator, above a point a thousand miles south of Dakar, in French West Africa. In the Northern Hemisphere this will be the official beginning of autumn, while spring will then commence in countries of the Southern Hemisphere.

A few days after this the moon will be full, on Sept. 27. This will be the "harvest moon." The peculiarity of this moon is that there is only a small difference in time in moonrise for several nights in succession. In September, this retarded rising is only half an hour, compared to about an hour and a quarter in March. Bright moonlight for a number of nights in succession is supposed to help the farmer to bring in his harvest.

Destination: Lyra

Lyra, which shines high overhead these evenings, has a number of points of interest. The entire solar system, the sun and all the planets, is moving through space toward Lyra at a speed of about 12 miles per second. The earth's distance to Vega, in Lyra, is about 23 light years; that is, 23 times the six trillion miles that a ray of light, traveling 186,000 miles each second, will cover in a year. This distance is lessening at the rate of more than 20 miles per second. Not only is the earth approaching Lyra, but Vega itself is moving towards our part of the sky at about 8.5 miles per second; fortunately,





☼ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

it is not so accurately aimed that there is any possibility of it ever hitting us.

The second brightest star in Lyra, Sheliak, or beta Lyrae, is the one shown on the southern sky map just above the R in the name "Lyra." As discovered in 1784 by John Goodricke, a 20-year-old deaf mute and amateur astronomer in England, Sheliak is a variable star. Ordinarily of magnitude 3.4, or slightly fainter than gamma Lyrae, the star just to the left, every 12.9 days it drops to about 4.5, about 2.75 times as faint.

Double Star

Actually there are two stars, very close together. One is relatively bright, and large, about 20 or more times the diameter of the sun. The other is smaller and fainter. Once in each 12.9-day cycle, the darker star passes directly in front of the brighter one, and the partial eclipse causes the reduction in brightness. Half way between these eclipses there is a lesser eclipse, as the bright star hides the faint one. This causes a smaller reduction in light.

Surrounding the pair there is a huge shell of gas, mainly hydrogen. This seems to originate in two streams that squirt out from each star, toward the other. The streams do not hit the other stars, however, because of their movement around the center of gravity of the system.

There is a marked difference in color of the two stars. The large bright one is bluish, while the other is yellow-white. It would be most interesting to observe the system from a closer position.

Actually, what is known about beta Lyrae has been learned from studies of its spectrum, the band of color, crossed by dark lines, which is produced when its light is analyzed by a spectroscope, attached to a large telescope. The spectrum undergoes sudden and curious changes. Astronomers have worked out the hypothetical structure described above as an explanation. There are still some very puzzling features, and Sheliak continues to be the subject of much astronomical research.

Celestial Time Table for September

Sept.	EST	
2	6:00 a.m.	Moon farthest, distance 251,900 miles.
4	3:56 p.m.	Moon passes Mars.
	9:00 p.m.	Mercury passes Venus.
6	5:24 a.m.	Moon in last quarter.
9	4:00 a.m.	Mercury farthest west of sun; visible low in east just before sunrise for a few days around this date.
12	4:03 a.m.	Moon passes Mercury.
	7:36 a.m.	Moon passes Venus.
13	7:02 a.m.	New moon.
14	noon	Moon nearest, distance 223,400 miles.
16	1:37 a.m.	Moon passes Jupiter.
18	1:00 a.m.	Mercury passes Venus.
19	9:33 a.m.	Moon passes Saturn.
	10:17 p.m.	Moon in first quarter.
23	8:10 a.m.	Sun over equator, autumn commences in Northern Hemisphere.
27	4:43 p.m.	Full moon—Harvest Moon.
29	5:00 p.m.	Moon farthest, distance 252,400 miles.

Subtract one hour for CST, two hours for MST. and three for PST.

GET READY FOR THE SPACE ERA! SEE THE SATELLITES . . . THE MOON ROCKETS

AMAZING TELESCOPE BUYS

AND OTHER OPTICAL BARGAINS

Photographers!

Adapt your camera to this Scope for excellent Telephoto shots and fascinating photos of moon!

This is an actual photograph of the moon taken through our Astronomical Telescope by a 17-year-old student.

See the Stars, Moon, Planets Close Up!

3" ASTRONOMICAL REFLECTING TELESCOPE

ASSEMBLED and READY TO USE!

Famous Mt. Palomar-Type

60 to 160 Power — An Unusual Buy!

You'll see the Rings of Saturn, the fascinating planet Mars, huge craters on the Moon, Star Clusters, Moons of Jupiter in detail, Galaxies! This is a fine quality, American-made telescope engineered and built for clear definition and resolution. Equatorial mount with lock on both axes—you automatically follow stars across the heavens. Aluminized and overcoated 3" diameter high-speed f/10 mirror. Each mirror Foucault tested. Telescope comes equipped with a 60X eyepiece and a mounted Barlow Lens, giving you 60 to 160 power. Accessory eyepieces available for powers up to 320. An Optical Finder Telescope, always so essential, is also included. Sturdy, hardwood, portable tripod.

Free with scope: Valuable STAR CHART and 272 page "Astronomy Book."

Stock No. 85,050-Q . . . . . **$29.50 f.o.b. Barrington, N. J.**
(Shipping wt. 10 lbs.)

New! 2 in 1 Combination Pocket-Size

50 POWER MICROSCOPE and 10 POWER TELESCOPE

ONLY $4.50 ppd.

Useful Telescope and Microscope combined in one amazing, precision instrument. Imported! No larger than a fountain pen. Telescope is 10 Power. Microscope magnifies 50 Times. Sharp focus at any range. Handy for sports, looking at small objects, just plain snooping.

Send Check or M.O. Satisfaction Guaranteed

Order Stock No. 30,059-Q **$4.50**

4¼" ASTRONOMICAL TELESCOPE

Mt. Palomar type! Up to 270 Power. A fine Reflector Telescope complete with real Equatorial Mount and Tripod and 6X Finder. Aluminum tube. 4¼" dia. mirror, rack and pinion focusing eye-piece holder. 2 eyepieces and mounted Barlow Lens for 40X, 90X, 120X and 270X. Low cost accessory eyepiece available for power up to 540. Shipping weight approx. 25 lbs.

Stock No. 85,006-Q, complete $74.50 f.o.b. Barrington, N. J.

REPLICA GRATING — LOW, LOW COST

It's here—after decades of effort! Replica Grating—on film—at very low price. Breaks up white light into full spectrum colors. An exciting display. 15,000 lines per inch, running long way on film 8" wide—grating area 7½". Thickness about .005". Dispersion about 24°. Use it for making spectroscopes, for experiments, as a fascinating novelty. First time available such large size — so cheaply.

Stock No. 40,267-Q—Piece 8" x 11" . . **$1.50 pstpd.**
Stock No. 50,180-Q—Piece 8" x 6' . . . . **$5.95 pstpd.**

Take Telephoto Shots Thru

7x50 MONOCULAR

This is fine quality, American made instrument—war surplus! Actually ⅛ of U.S. Govt. 7 x 50 Binocular. Used for general observation both day and night and to take fascinating telephoto shots with your camera. Brand new, $95 value. Due to Japanese competition we close these out at a bargain price. Directions and mounting hints included.

Stock No. 50,003-Q . . . . . **$15.00 Postpaid**

INSTRUCTION BOOKLETS

Easy to follow—accurate ⅛ x 11 page size—many illustrations. Do-it-Yourself—Save! and have Fun!

	Stock No.	Price Pstpd.
How to Build Projectors	9014-U	30¢
Homebuilt Telescopes	9006-U	40¢
Homebuilt Riflescopes	9018-U	40¢
All About Telephoto Lenses . .	9036-U	60¢

SALE! TERRIFIC WAR SURPLUS BARGAIN!

AERIAL CAMERA LENSES

Govt. Cost $1218— NOW $39.50 Used

Made by B & L and E.K.—24" F.L. f/6, in 23" long Lens Cone. Use as long range, Big Bertha Telephoto lens — for Richest field (wide field, low power) telescope, etc. Lenses are 4" dia.—precision 4-element type, Aero Tessar and Aero Ektar (no choice). Easily removed. Diaphragm (f/6 to f/22) is included. Opens approx. 1" to 3 ½". Lens and cone —wt. 25 lbs. Sturdy carrying trunk—wt. 26 lbs.

Stock No. 85,050-Q 24" used. Price $39.50 f.o.b. Utah

Stock No. 85,060-Q 24", new. Price $59.50 f.o.b. Utah

BEGINNERS LENS KITS!

Fun for adults! Fun for children! Kits include plainly written, illustrated booklet showing how you can build lots of optical items.

Stock No. 2-Q—10 lenses . . . . . **$ 1.00 Postpaid**
Stock No. 5-Q—45 lenses . . . . . **$ 5.00 Postpaid**
Stock No. 10-Q—80 lenses . . . . . **$10.00 Postpaid**

STEREO MICROSCOPE

American-Made Instrument at Over 50% Saving. Up to 3" Working Distance—Erect Image—Wide 3-Dimensional Field. Used for inspections, examinations, counting, checking, assembling, dissecting. 2 sets of objectives on rotating turret. Standard pair of wide field 10X Kellner Eyepieces give you 23 power and 40 power. Helical rack and pinion focusing. 10 - DAY TRIAL . . . complete satisfaction or your money back. **Order Stock No. 85,056-Q. Full price, $99.50 f.o.b. Barrington, N. J.** Low Power Supplementary Lens Attachment for above Stereo—provides 15X down to 6X with clear, extra large 1 ½" field at 6X.

Stock No. 30,276-Q **$7.50**

BUILD A SOLAR ENERGY FURNACE

Wonderful Geophysical Year School Project

Build your own Solar Furnace for experimentation — many practical uses. It's easy—inexpensive. Use your scrap wood. We furnish instruction booklet. This sun powered furnace will generate terrific heat—2000° to 3000°. Fuses enamel to metal. Sets paper aflame in seconds. Use our Fresnel Lens—14 ¾" diameter . . . f.l. 14".

Stock No. 70,130-Q...Fresnel Lens...$6.00 Postpaid

MAKE YOUR SCHOOL A POWERFUL ASTRONOMICAL TELESCOPE

Grind Your Own Astronomical Mirror

Complete Kits Including Blank, Tool and Abrasives

All over America amateurs are grinding their own mirrors and making expensive Telescopes cheaply. You can do the same using our Kits. These contain mirror blank, tools, abrasives, diagonal mirror and eyepiece lenses. You build instruments ranging in value from $245 to thousands of dollars.

Stock No.	Dia. Mirror	Thickness	
70,004-Q	6"	1"	**11.95** postpaid
70,005-Q	8"	1 ⅜"	**19.50** postpaid

GET FREE CATALOG #Q—World's largest variety of Optical Items. Bargains galore . . . War Surplus—Imported—Domestic! Items for making "Science Fair" Projects, Microscopes, Telescopes, Satellite Telescopes, Infrared Items, Prisms, Lenses, Reticles, Mirrors and dozens of other hard-to-get Optical Items.

Ask for FREE CATALOG #Q.

ORDER BY STOCK NUMBER . SEND CHECK OR MONEY ORDER . SATISFACTION GUARANTEED!

EDMUND SCIENTIFIC CO., BARRINGTON, N. J.

• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ABACUS ARITHMETIC: How to Perform Some Calculations on the Chinese Abacus—Welton J. Crook—*Pacific Bks*, 69 p., illus., paper, $1.50. Explains step-by-step how to use the abacus.

ACTION OF RADIATION ON TISSUES: An Introduction to Radiotherapy—A. Lacassagne and G. Gricouroff, translated by Clarence C. Lushbaugh and Gretchen R. Riese—*Grune*, 2nd ed., 199 p., illus., $6.25. Extensively revised text for medical students.

THE ADVANCEMENT OF MEDICAL RESEARCH AND EDUCATION THROUGH THE DEPARTMENT OF HEALTH, EDUCATION AND WELFARE—Stanhope Bayne-Jones, Chairman — *Govt. Printing Office* for Office of the Secretary, Dept. of HEW, 82 p., paper, 60¢. Final Report of the Secretary's Consultants on Medical Research and Education.

AGRICULTURAL GEOGRAPHY OF LATIN AMERICA —Wilhelm Anderson and others—*Govt. Printing Office* for Foreign Agricultural Service, U. S. Dept. of Agric., 96 p., maps, paper, 65¢. Graphic report on factors underlying Latin America's agriculture.

AUSTRALIAN EXPLORERS: A Selection from their Writings—G. Blaxland and others, introd. by Kathleen Fitzpatrick—*Oxford Univ. Press*, 503 p., map, $2.50. From the journals of explorers of this "most ancient land," the last refuge of primitive man and marsupial beast, tree fern and archaic palm.

BASIC GENERAL MATHEMATICS—Margaret Joseph and Mildred Keiffer; John R. Mayor, Ed.—*Prentice-Hall*, 458 p., illus., $3.52. A high school course for students not ready for traditional algebra course.

BORNEO PEOPLE — Malcolm MacDonald — *Knopf*, 426 p., illus., $6.50. Son of former British Prime Minister writes of the territory under his administration, the state of Sarawak.

THE CHANGING FACE OF NEW ENGLAND—Betty Flanders Thomson—*Macmillan*, 188 p., $3.75. In layman's language this botanist describes the history of the land's geological change by surveying its plants, animals, forests and rocky physiography.

CHOLESTEROL: Chemistry, Biochemistry, and Pathology—Robert P. Cook, Ed.—*Academic*, 542 p., illus., $15. For scientific workers in the field, it covers representative work, includes references and appendix of laboratory methods.

DATA FOR ELEMENTARY-PARTICLE PHYSICS—Walter H. Barkas and Arthur H. Rosenfeld—*Univ. of Calif. (Office of Technical Services)*, 21 p., paper, 75¢. For students and research workers in high-energy physics.

DISPERSION OF MATERIALS—Rolt Hammond—*Philosophical Lib.*, 230 p., illus., $10. For students as well as for experienced chemical engineers.

THE EARTH AND ITS GRAVITY FIELD—W. A. Heiskanen and F. A. Vening Meinesz—*McGraw-Hill*, 470 p., illus., $12.50. Presents new conclusions about the way the earth tends toward equilibrium, and about the character and size of deviations from this equilibrium.

ELECTRONICS MADE SIMPLE—Henry Jacobowitz—*Garden City Bks*, 192 p., illus., paper, $1. Explains basic principles, electron tubes and transistors, electronic circuits, radio, radar and television.

EXPLORING THE SUN—Roy A. Gallant—*Garden City Bks*, 57 p., illus. by Lee J. Ames, $2.50. A children's science book telling dramatically, yet simply, what we know about the sun and what it does for mankind.

FROM THE ENDS OF THE EARTH: An Anthology of Polar Writings—Augustine Courtauld, Ed.—*Oxford Univ. Press*, 423 p., $4.75. About voyages to the polar regions, from the ancients to the scientific explorers of our age.

GOOD NEWS FOR LATER LIFE—*N. Y. State Joint Legislative Committee on Problems of the Aging*, introduction by Thomas C. Desmond, 169 p., illus., single copies free upon request direct to Senator T. C. Desmond, 94 Broadway, Newburgh, N. Y.

HOOFS, CLAWS, AND ANTLERS: The Story of American Big-game Animals—Harold McCracken—*Garden City Bks*, 56 p., illus. by Lee J. Ames, $2.50. Acquaints the young reader with animals of the American wilderness.

HOW TO SOLVE CHEMISTRY PROBLEMS—C. H. Sorum—*Prentice-Hall*, 2nd ed., 184 p., paper, $2.25. A self-teaching review of first-year college chemistry principles, with problems, solutions, and answers.

INTERNATIONAL CONFERENCE ON THE NEUTRON INTERACTIONS WITH THE NUCLEUS: Proceedings—I. I. Rabi and others—*Atomic Energy Commission (Office of Technical Services)*, 279 p., illus., paper, $3.25. Conference held at Columbia University, New York, Sept. 9-13, 1957.

MAN IN THE PRIMITIVE WORLD: An Introduction to Anthropology—E. Adamson Hoebel—*McGraw-Hill*, 2nd ed., 678 p., illus., $9. Traces human development through evolution and culture.

MECHANICAL RESOLUTION OF LINGUISTIC PROBLEMS—Andrew D. Booth, L. Brandwood and J. P. Cleave—*Academic*, 306 p., illus., $9.80. Reports on results of the use of digital calculators for translating one language into another.

MODERN CHEMICAL PROCESSES: A Series of Articles Describing Chemical Manufacturing Plants—Walter J. Murphy, and others, Eds.—*Reinhold*, 154 p., illus., $5. By the editors of *Industrial and Engineering Chemistry* together with the technical staffs of the cooperating organizations.

OSCILLOSCOPE TECHNIQUE — Alfred Haas—*Gernsback*, 224 p., illus., paper, $2.90, hard cover, $4.60. The oscilloscope, a device for qualitative evaluation, allows us to "see electric waves."

PAPER: The Fifth Wonder—John H. Ainsworth—*Thomas Pub. Co.*, 180 p., illus., $4. Deals with specific phases of pulp and paper manufacture in popular digest form.

PARTICULATE EMISSION: Proceedings of the Symposium on Air Pollution held October 21, 1957, at The Franklin Institute in Philadelphia—F. E. DeMartini and others—*Journal of the Franklin Institute*, Monograph No. 4, 105 p., illus., paper, $3.

PREVENTIVE TECHNIQUES OF REHABILITATION FOR HEMIPLEGIC PATIENTS—Nila Kirkpatrick Covalt—*National Soc. for Crippled Children and Adults*, 16 p., illus., 25¢. Reprint from GP, March, 1958.

PROCEEDINGS OF THE INDIANA ACADEMY OF SCIENCE—Richard A. Laubengayer, Ed.—*Indiana State Lib.*, 331 p., illus., $3. Includes 7-page report of Indiana Junior Academy of Science.

PSYCHIATRY AND RELIGIOUS EXPERIENCE—

it's easy to learn all about

DIGITAL COMPUTERS

THE RIDER 'PICTURE-BOOK' WAY

BASICS OF DIGITAL COMPUTERS

by John S. Murphy

New 3 volume 'picture-book' training course

Here is the easiest, quickest, most economical way of learning all about the exciting new field of digital computers. If you have a knowledge of the fundamentals of electronics, you can master the basics of digital computers and understand the details of any specific digital computer with this new 3 volume 'picture-book' course. Written by an expert in the computer field, text matter has been tested and proven in the training of computer field engineers and technicians. More than 350 illustrations support the text. Volume I covers the background of computers; Volume II, the components and units; Volume III, the operation of the computer.

Basics of Digital Computers is ideal for training of programming personnel, maintenance men, for introductory training of engineering and technical personnel, for engineering students and for others who wish to broaden their knowledge of this new field.

#196, 3 vols., soft covers, set $6.95

#196-H, cloth bound, all 3 vols., $7.95

Now available at book stores or order direct.

10 day unconditional money-back guarantee.

John F. Rider Publisher, Inc. 8N-8
116 West 14 St., N. Y. 11, N. Y.

I enclose $_____. Please send

_____Basics of Digital Computers (soft cover set) $6.95 _____Cloth bound edition $7.95

Name_____

Address_____

City_____ Zone_____ State_____

Add city and state taxes where applicable. Canadian prices 5% higher.

TO MEN WHO JUST "CAN'T LEARN" MATH!

More and more in our dynamic economy, a knowledge of basic mathematics pays off!

Whether in Engineering, Electronics, Mechanics, Construction, Pure Science, etc.—or in Estimating, or Trade and Finance, or Buying and Selling, etc.—the man who gets there *fastest* with the *mostest*, MATH-WISE, is likely to be rewarded *handsomest!*

Fortunately, there now exists, in a single volume of 240 fact-packed pages (including 195 clarifying illustrations), a basic source in mathematics, from arithmetic to the calculus, arranged logically and in order of difficulty. Explanations of principles are followed by worked examples.

This one-volume math "library" economizes not only your money but, more important, your *time*. Amazingly, the author, with a rare talent for simplifying the complicated, covers the whole gamut: treatment of fractions, decimals, square root and cube root, logarithms, progression averages, interest, algebra, equations, graphs, plane and solid geometry, trigonometry, differential and integral calculus; useful mathematical tables; summary of mathematical formulas, etc., etc.

This remarkable work which already has aided thousands, will be of enormous help not only to those who have forgotten their mathematics but also to those now acquiring it. You may try it out at our risk. *ORDER NOW:*

A REFRESHER COURSE IN MATHEMATICS

by F. J. Camm

240 Pages • 195 Illustrations

2.95 Postfree • 10-Day Money-Back Guarantee

EMERSON BOOKS, Inc., Dept. 428-L
251 W. 19th Street, New York 11

Best Book Contest for 1958

$1600 Cash Awards plus 40% royalty. All types of manuscripts invited. For Contest rules and details of famous publishing plan, write for free Brochure 8N.

Pageant Press, 101 Fifth Ave., N. Y. 3

Louis Linn and Leo W. Schwarz—*Random House*, 307 p., $4.95. Of help to the religious leader in understanding the psychological problems of his congregation.

RELATIVITY FOR THE LAYMAN: A Simplified Account of the History, Theory, and Proofs of Relativity—James A. Coleman—*New Am. Lib.*, 127 p., illus. by the author, paper, 50¢. For the general reader.

ROCKS AND RAIN AND THE RAYS OF THE SUN—William Fox—*Walck*, 90 p., illus., $3. Takes young readers into the oldest factory there is—nature at work.

SEPARATION AND PURIFICATION OF MATERIALS—Rolt Hammond—*Philosophical Lib.*, 327 p., illus., $10. Covers solid-solid, solid-liquid, solid gas, liquid-liquid and gas-gas systems, with chapter on separation and purification in nuclear engineering.

SINGING STRINGS—Larry Kettelkamp—*Morrow*, 48 p., illus. with drawings by author, $2.75. Discusses the harps, the piano family, the guitars, and the violin family. Tells how to make simplified versions of the instruments. For young and old.

SPUTNIK INTO SPACE—M. Vassiliev with V. V. Dobronravov, translated from Italian by Mervyn Savill, introduction by William Beller—*Dial Press*, 181 p., illus., $3.75. A Soviet journalist, under the direct supervision of Soviet Academy members, reports about the present and future of Russian rockets, missiles and satellites.

A STROKE NEEDN'T STRIKE YOU OUT—Walter Lewis Reisner—*National Soc. for Crippled Children and Adults*, 16 p., illus., paper, 25¢. Directions to help rehabilitation of hemiplegic.

THE TARANTULA—William J. Baerg—*Univ. of Kan. Press*, 88 p., illus., $3. The tarantula's story, from the egg stage to maturity and death.

TOPOLOGICAL ANALYSIS—Gordon Thomas Whyburn—*Princeton Univ. Press*, 119 p., $4. Centered largely around results obtainable with the aid of the circulation index of a mapping and properties resulting from openness of a mapping.

A TREASURY OF SCIENCE—Harlow Shapley, Samuel Rapport and Helen Wright, Eds., introduction by Dr. Shapley—*Harper*, 4th rev. ed., 776 p., $6.95. New material on Radio Astronomy, Measurement of Geologic Time, The Origin of Life and Man's Ancestral Past. New sections on Rocketry and Space Travel, and Atomic Energy.

Science News Letter, August 23, 1958

Do You Know?

The Polygon of Drought is a vast *arid area* which sprawls over five states and 193,000 square miles in northeastern Brazil.

Glaciers are receding in the region of the Scandinavian ice cap at a rate of several hundred yards each year.

Stenosis of heart valve openings is a common form of heart disease which may be inborn or due to repeeated attacks of rheumatic fever.

Polyethylene, a plastic material, is made of ethylene gas which is a component of natural gas, or it can be derived from petroleum in refining.

Monkeys develop *ulcers* when they take part in executive-type experiments.

MATHEMATICS

Home study courses. Elementary, high school, and university levels. Very reasonable fees. Consult our catalog in your public library or write us directly.

UNIVERSAL CORRESPONDENCE SCHOOL OF MATHEMATICS, P.O.B. 5225 Oak Lane Station, Philadelphia 26, Pa.

giant inflatable toys of pre-historic monsters

7 GIGANTIC DINOSAURS for $1.00 plus 25c post.

up to 4 feet tall

Command these fun-loving pre-historic monsters to your every prank. Toss them in the air and they always land on their feet. Made of molded one piece quality latex, completely inflatable with genuine toss up feet action. Thrill to their fascinating names

PLATEOSAURUS - SEA SERPENT
PROTOCERATOPS - TRITASNAPATUS
SPHENACONDON - TRACHODON
CERATOSAURUS

7 different pre-historic monsters

Each set contains all 7 DINOSAURS for only $1.00 plus 25c postage and handling per set. The most exciting gift a child can receive. Money Back Guarantee. In ordering please PRINT name and address.

GIANT DINOSAURS, Dept. D-85A
114 EAST 32nd ST. NEW YORK 16, N. Y

Learn German, French, Spanish Italian ... ideal for brush-up, travel, school study ... only $4.95 per set

Students! Teachers! Only $4.95 for language courses in most useful languages. Each set contains 1½ hours of recording. Ideal for supplement, review, course text. Unexcelled for refreshing half-forgotten language. Each set contains 800 foreign sentences, English also recorded; everything modern, practical; manual with full record text, phonetic transcription; only fully indexed set on the market. "Practical, high quality, inexpensive," N. Y. HERALD TRIBUNE. "Twice as good as anything else on the market," L. A. Graham. "Among the very best," Mario Pei. Don't buy a more expensive set until you have tried **LISTEN AND LEARN** first. Guaranteed: returnable within 10 days for full refund. Each set contains 3 ten inch 33 1/3 records, manual, album.

Dept. 160, Dover Publications, Inc.
920 Broadway, New York 10, N. Y.
I am enclosing $..... in full payment for LISTEN AND LEARN.

- ☐ French, set.....$4.95
- ☐ German, set.....$4.95
- ☐ Spanish, set.....$4.95
- ☐ Italian, set.....$4.95

Name .....
Address .....
City..... Zone.....State.....
Mail in this coupon today.

900X "MICROBE HUNTER"

- **The only Microscope in its class featuring GRADE A optics!**
- **Power Range 25X, 50X, 75X, 100X, 150X, 200X, 300X, 400X, 600X, 900X**
- **Full Range Fine Adjustment**
- **Safety Stop on Coarse Adjustment**

This instrument—made to our rigid design specifications—has wide usage in schools, laboratories and law enforcement agencies. All of the most needed features have been incorporated to meet the requirements for diversified micro-studies. Highly recommended for serious hobbyist desiring exceptional quality at modest cost. Power range from 25X to 900X in 12 possible combinations. Geared rack and pinion coarse focusing. Micro-motion fine focusing of full range—12 complete revolutions. Safety stop prevents over rise. 36mm dual surface (plano/concave) mirror. Fixed square stage, 70mm X 80mm. Rotating 5-hole, disc diaphragm. Three Huygenian eyepieces of 5X, 10X and 15X. Four achromatic objectives of 5X, 10X, 40X and 60X. Oversize base insures stability and protects objectives. Body tilts through 60°—perfectly balanced at any angle. Complete with upright, wooden carrying case.

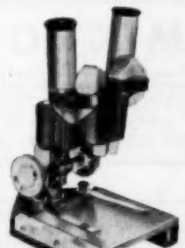
F-338—List $69.95.....Net $39.95
(Add $1.00 for postage and handling)

NEW! 30-X STUDENT "STEREOSCOPE"
• WIDE FIELD 3-DIMENSION VIEW

A 30X stereoscopic binocular microscope—designed primarily for the student and serious hobbyist. Includes most of the features of our "Semi-Pro" model shown on this page. Fixed objective lenses and non-interchangeable eyepieces. All optics are achromatic. Ground glass stage measures 2 ⅝" x 2 13/16". Overall height 7 ⅝". Complete with fitted wooden carrying case.

F-335 .....Net $19.95
(Add 85¢ for postage and handling)

All Equipment Protected by 10-Day Guarantee & 90-Day Warranty



OLIVER GARFIELD CO., Inc.
Dept. SL-88-D, 108 East 16th St., New York 3, N. Y.
Please ship immediately the following:
900X F338 @ $39.95 *(plus $1 postage & handling)* .....
30X F335 @ $19.95 *(plus 85¢)* .....
NAME ..... STREET .....
CITY ..... ZONE..... STATE.....

BLOOD PRESSURE MEASURE

For Doctors — For Nurses

For Patients Who Require Frequent Measurement of Their Blood Pressure

Genuine World Famous Mercurial Sphygmomanometer

A special quantity purchase enables us to offer this famous name brand Blood Pressure instrument to those who have occasion to measure their blood pressure frequently, a quality instrument, at about half the regular price.

Its outstanding Features are:

1—Scientifically accurate
2—260 mm Calibration
3—Thoroughly Portable
4—Silvertone finish case
5—For home or office use
6—Highest quality Inflation system
7—A finished product—4 ½ "x13" closed

Fully Guaranteed by renowned manufacturer
Complete service always available

MADE IN U. S. A.

NOW $21.85 Postpaid

John Surrey Ltd.

Dept. SN-69 11 W. 32nd St., New York 1, N. Y.

INVENTORS NEEDED AT ONCE

If you have an invention you wish to sell outright or license on royalty, write us at once. We are seeking inventions of household items, games, toys, sports items, tools, and mechanical and technical devices. Patented or unpatented. For further information and free brochure outlining manufacturers' requirements, royalty rates, send name (no drawings, please) on letter or postcard at once.

KESSLER CORPORATION, Dept. D-418, Fremont, Ohio

NICE CAR *deserves a* NEW KozaK ?

SPECIAL OFFER: One regular and one SUPER Auto DRYWASH cloths — $7 value for $5. Safely wiping and DRY-washing nice cars for 33 years. Save their cost dozens of times. Mailed at once. Guaranteed. KozaK, 97 S. Lyon St., Batavia, N. Y.

Buy ALL Your Books

This Convenient Way!

Science Service will fill your order for any U. S. book, in print, at regular retail prices. *Postage prepaid.*

Send orders and remittances to

Book Department

SCIENCE SERVICE
1719 N Street, N.W.
Washington 6, D. C.

MICRO-ADS

Equipment, supplies and services of special interest to scientists, science teachers and students, science-minded laymen and hobbyists.
25¢ per word, payable in advance. Closing date 3 weeks prior to publication (Saturday).

SNL, 1719 N St., N.W., Washington 6, D. C.

INDIAN RELICS

FLINT ARROWHEAD MAKING SECRET! Ancient methods. Illustrated. $1.00. Guaranteed. Chief Blackhawk, Kennewick 18, Washington.

MISCELLANEOUS

BINDERS FOR SNL—BUFF-COLORED BUCKram Snap-in metal strips holds 52 copies. $4.00 pp. Send order with remittance to Science News Letter, 1719 N Street, N.W., Washington 6, D. C.

PUBLIC SAFETY

Cars' Knobby Interiors Major Cause of Injuries

➤ A MAJOR CAUSE of injuries in automobile collisions is the interior of today's cars with their protruding steering wheels, door handles, radio dials and other knobby parts.

This has been discovered in tests over a ten-year period by a research team at the Institute of Transportation and Traffic Engineering of the University of California at Los Angeles.

Injuries occur during secondary collisions when the car occupant is thrown against some interior component, rather than during the primary collision between the car and another object.

A frequently lethal weapon is the rigid steering wheel column, which often functions like a spear against the driver hurtled forward and against the column during the collision impact.

Arnold W. Siegel, assistant project engineer, foresees in the next few years a number of automobile changes designed to protect the driver and passenger:

1. A retractable or a collapsible steering column will eliminate spearing the driver and will absorb most of the energy upon impact with the driver.

2. Safety belts will be worn by almost all drivers and passengers. In addition to the current lap belts, there may be shoulder harnesses. Another safety addition will be head supports to cut down on neck whiplash injuries during rear-end collisions.

3. Padding of the interior with foam plastic or similar material will reduce puncture-type wounds, while a general redesigning of the interior will eliminate dangerous protruding parts.

But even with all possible safety features, the decisive factor is still the driver's attitude and behavior, Mr. Siegel warned.

"It is important to realize that a motorist, without a safety belt, involved in a collision at a mere 25 miles per hour can hit the car's interior with the same impact severity as a pedestrian being hit by a car traveling at 25 miles per hour," Mr. Siegel said.

Science News Letter, August 23, 1958

PUBLIC HEALTH

Chemist Group Attacks Doctors' Chemical Plan

➤ THE AMERICAN MEDICAL Association's model legislation for control of hazardous substances has drawn heavy fire in Chicago from spokesmen for the Manufacting Chemists' Association.

The feature of the A.M.A. plan that drew heaviest criticism from Dr. Thomas W. Nale and Sanford J. Hill, representatives of the Washington, D. C., organization of chemical producers, is the "unfeasible" broad scope of regulation over chemical products designed for use in industry as well as in the home. They expressed their views before the A.M.A. Committee on Toxicology.

They contended it is one thing to label and regulate hazardous chemicals sold in small containers for wide use in homes by inexperienced persons, and quite another thing to regulate those same chemicals sold in bulk to a few trained industrial users.

The A.M.A. plan would attempt to control chemicals designed with both uses in mind through the same set of regulations and through a single agency, Dr. Nale and Mr. Hill pointed out.

They added that the A.M.A. model legislation "arises out of the 'great number of poisonings' in the household."

"While we are not convinced of the validity of the A.M.A.'s contention as to the number of poisonings due to the use of household chemicals, the safety record of chemicals used in industry has been excellent," they said.

The chemical spokesmen suggested potentially dangerous household chemicals could be regulated through the Federal Food and Drug Administration, while another organization could be formed with entirely different objectives to oversee the industrial use of chemicals.

However, they stated they did not believe that "any case has been made for Federal legislation regulating the labeling of industrial chemicals at this time."

Science News Letter, August 23, 1958

Questions

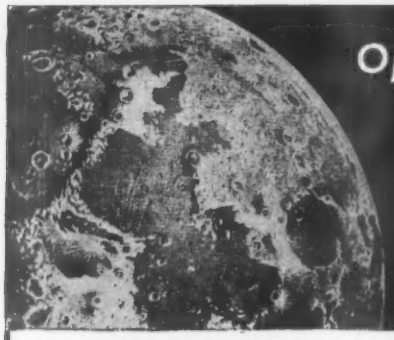
ENGINEERING—How do the ionic pumps create ultrahigh vacuums? p. 121.

MEDICINE—What are the symptoms of cholera? p. 119.

PSYCHIATRY—What body chemical has been found in short supply in adult schizophrenics? p. 118.

ZOOLOGY—What glands seem to be involved in arteriosclerosis in caged animals? p. 116.

Photographs: Cover and p. 115, U. S. Navy; p. 117, U. S. Army; p. 118, General Electric Research Laboratory; p. 119, Convair; p. 128, Alco Products.



Open Wider Windows On The Living World

WITH THIS TIMELY OFFER FROM

The Natural History Book Club

ANY TWO OF THESE BOOKS FREE

With Your First Membership Selection.

FROM THE MOMENT THE *SPUTNIKS* AND *EXPLORER* sent out the space signals heard 'round the world, membership in the Natural History Book Club has risen at an extraordinary rate. A knowledge of Geophysics and the other Natural Sciences must — from now on — be the property of every informed American man and woman.

That is exactly what membership in the Natural History Book Club gives you. Month by month, you will receive informative books of gripping interest, intensely readable and highly knowledgeable. Each such book is the work of an authority in his chosen subject, and *every* book will open a wider window on the universe around you.

THROUGH MEMBERSHIP, you may project yourself into Space with Willy Ley—acknowledged as America's foremost expert on the subject. Orbit about the Earth in his authoritative and definitive book, *Rockets, Missiles and Space Travel.* Or, in *To Hidden Depths,* live with Captain Philippe Tailliez amid the wonders of the underwater sea, equipped only with fins and aqualungs while you share this twilight zone with sharks, whales, giant morays and octopi. Delve into the mysteries of the "Abominable Snowman" as described by Dr. Maurice Burton, a phenomenon so intriguing that *right now* two expeditions — one Russian and one American — are seeking this rumored man-like monster in the mountains of Afghanistan and the wildest Himalayas. We sincerely believe that this Club makes a genuine contribution to a more informed Society. And — most especially — we offer it to those families who believe their children should be exposed to richer fare than comic strip learning.

ROCKETS, MISSILES AND SPACE TRAVEL
by Willy Ley
Newly revised and enlarged edition brought thoroughly up to date. The definitive source book in its field, by America's foremost authority.
Retail Price—$6.75

THE ANATOMY OF NATURE
by Andreas Feininger
Strikingly beautiful and revealing photographs illuminate a brilliant text unveiling the facts of life within Nature's cycle.
Retail Price—$5.95

THE ATLANTIC: History of an Ocean
by Leonard Outhwaite
Combining history, geography and oceanography, here is a continuously interesting book spanning the Atlantic story from earliest times to the present.
Retail Price—$6.50

TO HIDDEN DEPTHS
by Capt. Philippe Tailliez
Fascinating, intimate account of underwater exploration, with 12 amazingly beautiful photographs in full color, and almost 50 in monochrome.
Retail Price—$5.00

EXPLORING AMERICAN CAVES
by Franklin Folsom
The history, geology, lore and location of the last "unexplored frontiers". An exciting account of the men and women who light their way beneath the earth's crust.
Retail Price—$5.00

THE WILD HUNTERS
by Gene Caesar
Exciting and suspenseful account of the wild predators of America, their intelligence and social organization, with true narratives of almost unbelievable exploits.
Retail Price—$3.75

THE PURSUIT OF SCIENCE IN REVOLUTIONARY AMERICA
by Brooke Hindle
The little-known story of the first daring men who introduced the knowledge of the sciences to the colonies.
Retail Price—$7.50

MAN AND ENERGY
by A. R. Ubbelohde
A profound study, by a world-renowned scientist, of the use of energy through the ages, and the fundamental changes brought to modern life by new methods for its release.
Retail Price—$5.00

THE WONDER OF SNOW
by Corydon Bell
This fascinating book penetrates the mysteries of nature's most spectacular phenomenon — and its influence on mankind throughout the world.
Retail Price—$5.00

ANIMAL LEGENDS
by Maurice Burton
Amazing facts and some fancies about the acts of animals, extraordinary incidents based on evidence. A revealing and informative treasury of Nature lore.
Retail Price—$4.95

FREE!... ANY 2 BOOKS IF YOU JOIN NOW

As your introduction to the benefits of the Natural History Book Club, we urge you to select any two of the excellent books on this page — FREE — along with a third as your first Club selection. You pay only the special Membership price of $3.89 plus postage. And the total retail worth of the THREE BOOKS can be over $20.00.

Membership entitles you to The Natural History Book Club *News* FREE. Each month, this publication describes the new selection, as well as other fine books which are available. If you do not desire the selection, you simply notify us on a form which is always provided. Your only obligation is to accept as few as four selections in the first year. After that, with the purchase of each additional four selections, at special Membership discounts—you will receive a valuable bonus book FREE.

Selections are limited. We ask that you make your choice early. Check the TWO FREE books you desire, and make your first Membership Selection now. Send no money. We will bill you $3.89 for ALL THREE after you have received the books.

THE NATURAL HISTORY BOOK CLUB, Dept. 8-U-YN
11 East 36th Street, New York 16, N. Y.

Please enroll me as a Member and send the THREE BOOKS I have checked. Two are my FREE GIFT for joining and my third is my first Membership selection. I will pay you $3.89 plus postage. I can accept as few as four selections in the first year — all at Members' discounts. For every four additional selections, I receive a valuable bonus book FREE.

- ☐ Rockets, Missiles and Space Travel—306
- ☐ The Anatomy of Nature—1152
- ☐ To Hidden Depths—1201
- ☐ The Atlantic: History of an Ocean—1241
- ☐ Exploring American Caves—1133
- ☐ Animal Legends—1237
- ☐ The Wonder of Snow—1184
- ☐ Man and Energy—1077
- ☐ The Pursuit of Science in Revolutionary America—1085
- ☐ The Wild Hunters—1238

PLEASE NOTE: A "Double Selection"—or a set of books offered to members at a special combined price—is counted as a *single book* in reckoning Bonus Book credit, and in fulfilling the membership obligation.

MY NAME_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 949. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

MECHANICS KIT designed for home use contains a quarter-inch drill and more than 50 accessories. Included are bits for wood or metal, sanding discs, a grinding wheel, a 21-piece socket wrench set and a buffing wheel. The drill kit comes in a metal carrying case.

Science News Letter, August 23, 1958

ONE-EGG INCUBATOR permits the entire chick hatching process to be viewed through a clear plastic dome. An egg is inserted under the dome and the unit is plugged into a wall outlet. The dome is one and one-half inches in diameter.

Science News Letter, August 23, 1958

UNDERGROUND REFUSE RECEIVER has an aluminized steel top and rim and a toe-step lid lifter that responds to ordinary foot pressure. The receiver's outer shell is made of heavy gauge steel and coated with black asphaltum paint. The inner removable can is made of galvanized steel. The receptacle is available in four sizes.

Science News Letter, August 23, 1958

SILICONE RUBBER CHANNELING is designed to insulate glass jalousies. The channeling is made to be placed over the top edges of jalousie panes and cut to fit

with a pair of scissors, as shown in the photograph. It is said to keep in cool air from air conditioning and small insects out during the hot weather.

Science News Letter, August 23, 1958

WATER-FILLED PULL-TOY has a turtle that swims and rings a bell. Held under a clear plastic dome, the toy is described as leak-proof. It is made entirely of plastic and is brightly colored.

Science News Letter, August 23, 1958

GARDEN TOOL is a three-in-one helper. Made of aluminum, the tool can be used as a rake, a hoe and a weed digger. It is reversed to convert it from a hoe to a weed digger. To use as a rake, press a button on the handle and pull a trigger. The rake adjusts to any desired width from six to 13½ inches.

Science News Letter, August 23, 1958

ILLUMINATED VIEWER has a 25-by-34-inch viewing area and is four and one-half inches thick. Stainless steel film clips hold negatives or plates in place over the viewing surface. A square frame permits the use of a "T" square to convert the viewer into a stripping table.

Science News Letter, August 23, 1958

RECHARGEABLE DRY SHAVER operates without cords or batteries. The accumulators and complete recharging set are built in. Recharged by plugging into an electrical outlet for a few hours or overnight, the shaver has enough power for a week of daily use.

Science News Letter, August 23, 1958

Nature Ramblings

By HORACE LOFTIN

ALL OF THE WORLD'S food ultimately comes from plants, since plants alone among all living things are able to manufacture organic material from the raw materials of carbon and water, using the sun's energy to bring about the process. One special ingredient that plants have which helps them to create food is the green pigment "chlorophyll."

It is this chlorophyll which gives the typical green color we associate with the world of plants.

Although all food comes from plants, not all plants are able to manufacture food. Most plants lacking chlorophyll are as dependent upon their green brethren for organic material as are the animals. Foremost among these "plant-eating" plants are the fungi, such as the familiar mushroom.

Mushrooms normally get their nourishment from dead, decaying organic material.

"Plant-Eating" Plants

Twisting and turning in a great tangled mat in the ground under the "umbrella" of the mushroom are numberless fine threads, called mycelia. These threads absorb food material and water, grow and enlarge and eventually give rise to more typical mushroom umbrellas above ground.

As a matter of fact, the umbrella or "cap" is made up of these threads. When the reproductive season is at hand, certain of the threads which are balled up to form a "button" line up parallel to each other. These begin to grow, with the whole taking the mushroom shape of stalk and cap.

Certain threads on the newly formed cap produce spores by the millions. It is calculated that some mushrooms can release half a million spores per minute continuously for three or four days! These minute cells may be carried for miles by winds or water. Whenever they come to rest in a suitable spot, they begin to shoot out filaments which grow into new networks of threads and thus into new plants.

Threads from a single spore usually spread radially at a more or less uniform rate as the soil becomes depleted of food. Thus, when the mushrooms make their appearance above the soil, they often form a circle, the "fairy ring."

For some mushrooms, the yearly outward spread of these "fairy rings" is well known, and from the size of the rings their ages can be calculated. In England, some patches have thus been dated to be from 400 to 600 years old.

Science News Letter, August 23, 1958